Elveflow® OB1 Pressure Controller

USER GUIDE

November 2014

ELVEFLOW
PLUG & PLAY MICROFLUIDICS

READ THIS MANUAL CAREFULLY BEFORE USING THE INSTRUMENT

This manual must be read by any person who is or will be responsible for using, maintaining or repairing the OB1 Pressure Controller.

Due to the continual development of the products, the content of this manual may not correspond to the new product. Therefore, we retain the right to make alterations without prior notification.

Important OB1 safety notices:

1. The OB1 must be used in a **clean and dry environment**, with up to 60% relative humidity.
2. Use a power cord of the correct voltage. The OB1 requires a **24 V DC input voltage**.
3. The input pressure must be between 1.5 and 10 bar. **Do not connect a pressure source greater than 10 bar** at the back of the instrument.
4. The OB1 must be used exclusively with neutral, dry, dust- and oil-free, and particle-filtered gases, at a minimum of 5 µm particle size. **Use a particle/humidity filter between the pressure source and the OB1.** Please refer to ISO 8573-1, cl. 3 for detailed information.
5. **Use particle/anti-backflow filters** with pore size of at least 5 µm on 0 to 200 mbar, 0 to 2 bar and -1 to 1 bar outlets to avoid inserting particles or liquid in the instrument.
6. The OB1 can deliver up to 8 bar of output pressure. This level of pressure can be dangerous in some circumstances and has to be handled accordingly. **Use adapted reservoirs and tubing.** Do not use standard glass reservoirs and tubing, as the 8 bar output pressure is beyond the kit's rated capacities.
7. For the safety of both the user and the instrument, **do not use the instrument in connection with substances that could emit toxic or corrosive fumes**, such as acids or alkalis.
8. **No liquids or solids** should enter the OB1.
9. **Disconnect your sample reservoir from the instrument after each experiment** to prevent backflow from the reservoir to the instrument.
10. **Close the pressure outlets with the luer integral lock** when not using the OB1 to prevent any contaminants from entering the instrument.

IF THESE CONDITIONS ARE NOT MET, THE USER IS EXPOSED TO DANGEROUS SITUATIONS AND THE INSTRUMENT CAN UNDERGO PERMANENT DAMAGE. ELVESYS AND ITS PARTNERS CANNOT BE HELD RESPONSIBLE FOR ANY DAMAGE RELATED TO THE INCORRECT USE OF THE INSTRUMENTS.

Contents

Description

The Elveflow® pressure control instruments are designed to generate a stable and pulseless flow with short response time for a wide variety of demanding microfluidic applications.

The Elveflow® OB1 Pressure Controller offers superior fluidic performances compared to microfluidic syringe pumps or peristaltic pumps and deliver the smoothest flow with the highest accuracy, as no moving mechanical part is used in the pressure generation process.

The Elveflow® OB1 instrument is controlled by a computer through USB connection, using the Elveflow® Smart Interface that allows you to perform real-time creation, monitoring and modifications on complex pressure or flow rate profiles such as sine, square, triangle, ramp, pulse or sawtooth.

Last but not least, the Elveflow® Smart Interface allows recording and exporting the data generated by all the Elveflow® instruments connected and involved in your experiment.

Prior to use

Before setting up your OB1, please check the package contents to verify that you have received the items below:

1. The instrument;
2. a USB cable;
3. a power supply unit;
4. a USB flash drive containing the Elveflow® Smart Interface software and the user guides;
5. several plugs:
    a) male luer integral lock ring plugs (for calibration step of 200 mbar and 2 bar units),
    b) push-in plug fitting 4 mm OD (for calibration step of 8 bar units);
6. male luer lock to 3/32” OD barbs;
7. particle/humidity filter with holder.

Optional Accessories:

You may have ordered some additional elements (e.g. flow sensor units, reservoirs, tubing) so please check that you have received all the corresponding items.

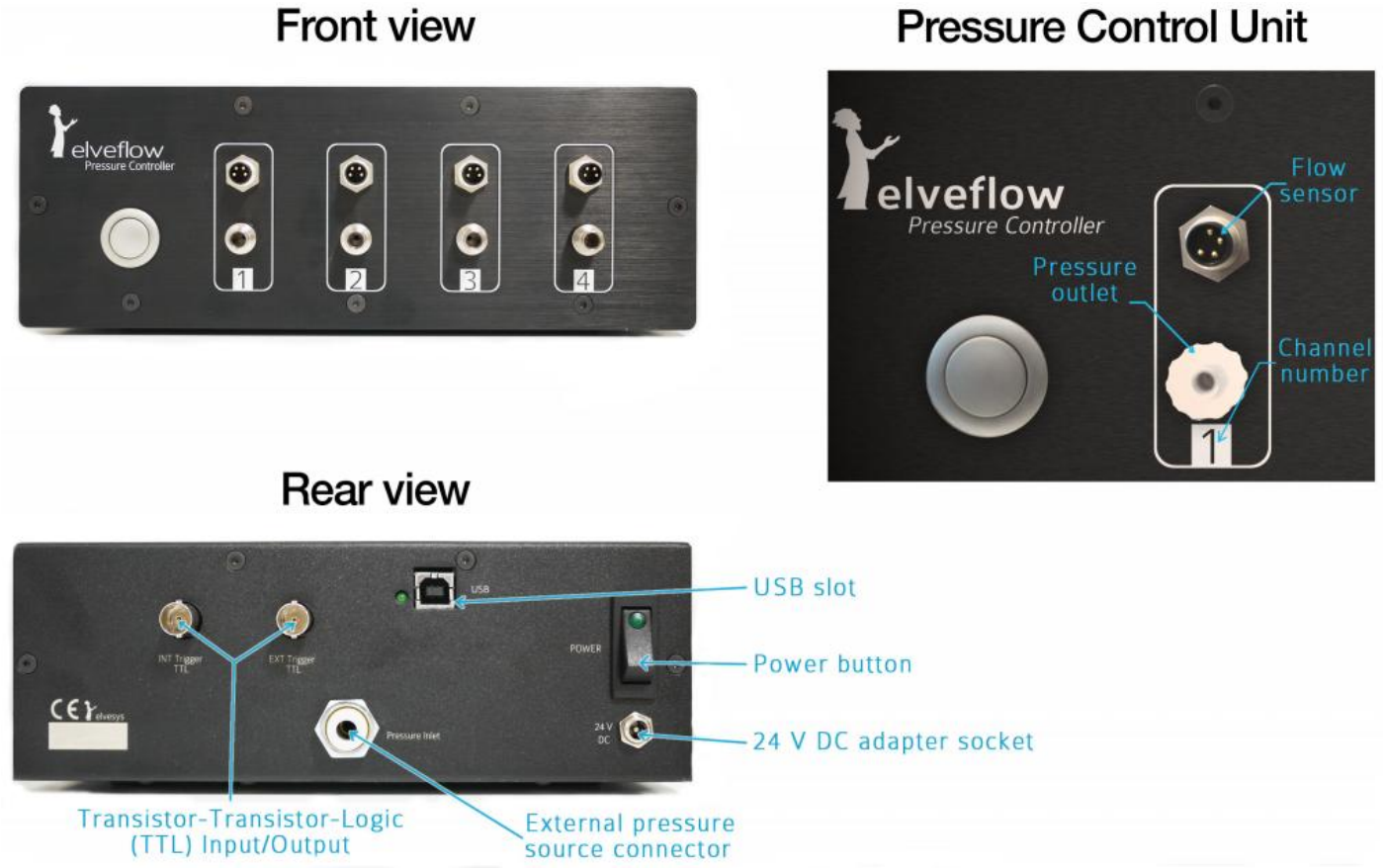
If any parts are missing or damaged, please get in touch with Elveflow support immediately:

contact@elveflow.com

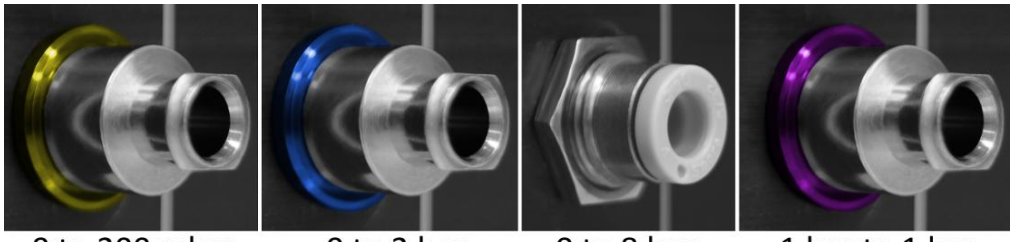
Setup and use

Getting started

Instrument description



Pressure ranges: color code



Minimum system requirements

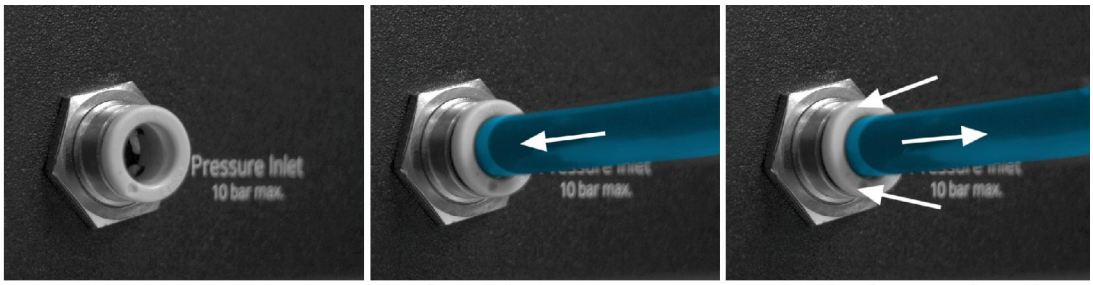
- Window XP SP3 or later - both 32 and 64-bit versions are supported;
- USB 2.0 port or faster;
- 1 GB RAM;
- 3.0 GHz Pentium 4;
- 1 GB of free hard disk space.

Installation of the software: Elveflow Smart Interface

1. Plug the Elveflow® USB flash drive tothe computer.
2. Open the Elveflow folder.
3. Run Install.exe.
4. Follow the instructions presented by the installation assistant.
5. **Restart your computer** when prompted to finish the installation process.

Calibration setup

1. **Connect the pressure/vacuum sources** to the corresponding push-in connectors at the rear side of the OB1. Note that the vacuum inlet is not required if the instrument is used only in positive pressure mode.



Connector ring | Push tubing to connect | Push ring and pull tubing to disconnect

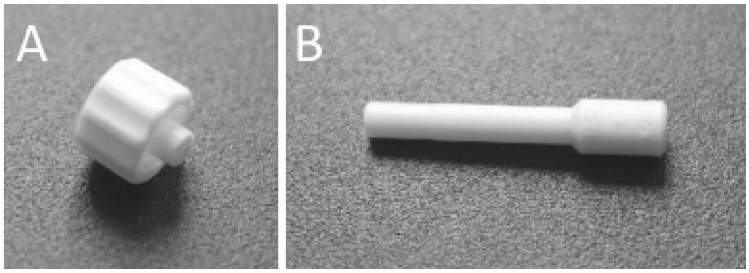
2. Note that the supplied **particle/humidity filter** must be placed between the pressure source and the OB1, immediately before the OB1's positive pressure inlet. The arrow on the filter indicates the direction of air flow: from the pressure source to the instrument.

3. Connect the instrument to the computer using the **USB cable** ("USB" marking).

4. **Plug the power adapter** to the instrument ("24 V DC" marking), then plug the adapter to an electric plug.

5. **Turn the power switch on** at the rear side of the instrument.

6. **Close the pressure outlets** using the corresponding luer integral locks/push-in plug fittings:
   A: 200 mbar, 2 bar and -1 bar outlets;
   B: 8 bar outlets.



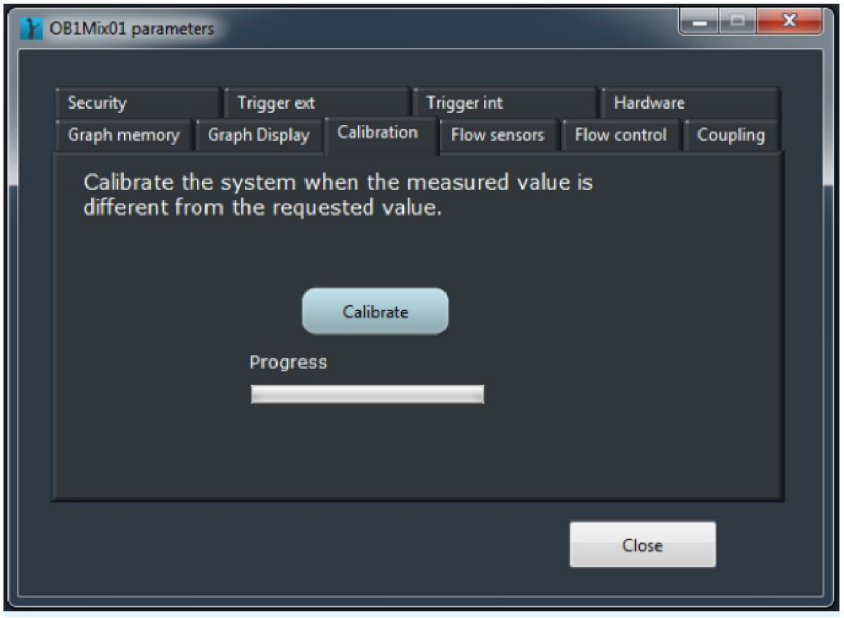
7. **Launch the Elveflow Smart Interface**, click on "Connect a new instrument" and follow the assistant.

8. Click on the "**Preferences**" icon on the Elveflow Smart Interface.

9. On the "Calibration" tab, click on "**Calibrate**". The automatic calibration process last around 20 minutes.

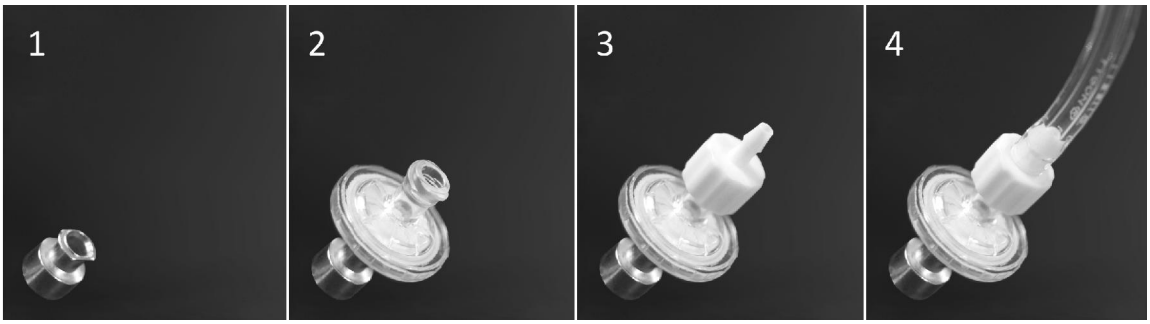
   A calibration is recommended:

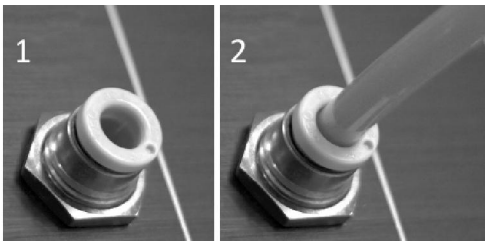
   - when the instrument is connected to a computer for the first time;
   - any time a difference between the requested value and the measured value is observed.



Experimental setup

1. Connect the pressure outlets to sample reservoirs using a male luer-lock 3/32 OD barbs and flexible tubing (for 0 to 200 mbar, 0 to 2 bar and -1 to 1 bar channels) or 4 mm OD tubing (for 8 bar channels), as shown in the figures below. **Use a filter on the luer-lock pressure/vacuum outlets.**





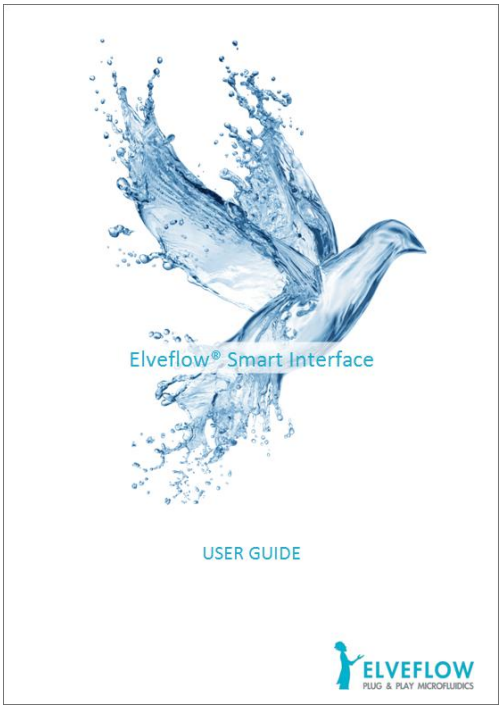
Note: the use of filters is highly recommended in order to prevent accidental insertion of liquids in the instruments due to backflow and generally does not affect performance. In some cases, however, it may increase settling time, especially when using large reservoirs (~100 ml). The removal of the filter – although not recommended - will render the instrument more responsive in this case.

2. Connect your microfluidic chip to the reservoirs. Please refer to the dedicated user guide for details on setting up microfluidic accessories.

3. You are now ready to start your first experiment.

Using the Elveflow Smart Interface

The Elveflow® Smart Interface's main features and options are **covered by a specific guide**. Please refer to this guide for a detailed description.



You will also find dedicated user guides for:

- The other instruments of the Elveflow product line;
- Flow sensors;
- Accessories for microfluidics (reservoirs, flow restrictors, etc.).

Supplementary information

Conditions of use

Terms and conditions of use

We strongly believe in the intrinsic quality of our microfluidic instruments line and we hope that you will be pleased with your purchase. However, in the unlikely event that you should receive damaged or incorrect goods in your delivery, please notify us within 7 days of receipt.
You will be offered the option of a refund or an exchange (provided the goods are in stock).
You may be asked to return goods for inspection. In this case we will refund the shipping fees.
Should the damaged or incorrect item be no longer available, you will be given the option of a refund.
Please note that goods that become damaged or broken after 7 days of receipt cannot be returned.

Unwanted items

If for any reason you do not wish to keep your purchase and would like a store credit, then please notify us within 7 days of receipt.
We cannot accept unwanted returns that have been opened, used or damaged by the customer.
For unwanted goods, we allow up to 14 days for the return of goods. We will only issue a credit upon receipt of all returned goods.
Please note that we are unable to refund your costs in returning unwanted goods or the delivery costs of sending the goods to you in the first place.

Cancellations
If you wish to cancel your order please email us immediately: contact@elveflow.com.

Privacy Policy
Customer details remain private and confidential and will not be released to a third party unless required to do so by law.
We use the information we collect about you to process orders, to provide a more personalized shopping experience and, if you request it, to notify you about new products, special offers or other information that may be of interest to you. We do not sell or pass on any personal information to any other Companies or Organizations.

Payments & Procedures
Payment from private customers must be paid for in advance of shipment. Trade orders from registered companies or organizations can be invoiced. Payment is due strictly within 30 days of the invoice date.

Products & Prices
Please note that some goods may vary in style, color or detail from the image shown. We reserve the right to change prices at any time.

Transport and storage

Be careful not to harm or shake Elveflow products while moving Elveflow® products must not be transported when plugged. Store products in standard conditions in an adapted box (typically the one used to send you the product).
Humidity and temperature must not exceed those of the specifications.

Exclusive remedies

The remedies provided herein are the customer's sole and exclusive remedies. Elveflow® shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Safety Information

THE FOLLOWING GENERAL SAFETY PRECAUTIONS MUST BE FOLLOWED DURING ALL PHASES OF OPERATION, SERVICE, AND REPAIR OF THIS INSTRUMENT. FAILURE TO COMPLY WITH THESE PRECAUTIONS OR WITH SPECIFIC WARNINGS ELSEWHERE IN THIS MANUAL VIOLATES SAFETY STANDARDS OF DESIGN, MANUFACTURE, AND INTENDED USE OF THE INSTRUMENT. ELVESYS ASSUMES NO LIABILITY FOR THE CUSTOMER'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.

Important advices

Elveflow products are for research use only.
No liquid should enter into the OB1 otherwise this would void the warranty.
The pressure source connected to the OB1 must be dry, dust and oil free, and of maximum 10 bar.
Please take the required action to ensure that these conditions are met and maintained.

Conditions of use

This instrument is intended for indoor use. It is designed to operate at a maximum relative humidity of 60% and at altitudes of up to 2000 meters. Operating temperature range is +5°C to 50°C.

Do not operate in wet/damp conditions: to avoid electric shock, do not operate this product in wet or damp conditions.

Do not operate in an explosive environment: do not operate the equipment in the presence of explosive or flammable gases or fumes.

Warning: Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. The protective features of this product may be impaired if it is used in a manner not specified in the operating instructions. Before installing, handling, using or servicing this product, please consult the data sheet and user manual.

Failure to comply with these instructions could result in death or serious injury. If the buyer shall purchase or use Elveflow® products for any unintended or unauthorized application, the buyer shall defend, indemnify and hold harmless Elveflow® and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if Elveflow® is allegedly negligent with respect to the design or the manufacture of the product.

Pressurized Equipment

Care must be taken when the Elveflow pump is pressurised to ensure that the instrument is not damaged in any way.

Protection

Safety glasses and labcoat should be worn at all times when using an Elveflow pressure pump due to the use of pressurised equipment. This is particularly important when hazardous liquids are used.

Electrictity advices

Use Elveflow® instruments with the provided power unit only. Maintenance should only be attempted by qualified Elveflow® personnel. Removal of the back panel may invalidate any warranty.

Before applying power: verify that the line voltage matches the product's input voltage requirements and the correct fuse is installed. Use only the specified line cord for this product and make sure the line cord is certified for the country of use.

Fuses: only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short circuited fuse holders. To do so could cause a shock or fire hazard.

Keep away from live circuits: operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified service personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed.

To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

ESD precautions: the inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.

Maintenance advices

Maintenance should only be attempted by qualified Elveflow® personnel.

Removal of the back panel may invalidate any warranty.

Do not service or adjust alone: do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Do not substitute parts or modify instrument: because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument.

Return the instrument to an Elveflow® Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Instruments which appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified Elveflow® personnel.

CE compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Electromagnetic Compatibility

COUNCIL DIRECTIVE 89/336/EEC of 3 May 1989

This directive has been amended by the following Council Directives:

1. 92/59/eec of 29 June 1992 (General Product Safety)

2. 93/68/eec of 22 July 1993 (CE Marking directive)

3. 99/5/ec: Directive of Radio Equipment & Telecommunications Terminal Equipment (R&TTE).

Warranty

ELVEFLOW is a brand of ELVESYS Innovation Center.

The ELVESYS hardware products are warranted against defects in material and workmanship for a period of one year from date of delivery. ELVESYS software and firmware products, that are designated by ELVESYS for use with a hardware product and when properly installed on that product, are warranted not to fail to execute their programming instructions due to defects in material and workmanship for a period of 60 days from date of delivery. During the warranty period ELVESYS will, either repair or replace products that prove to be defective. ELVESYS does not warrant that the operation for the software, firmware or hardware shall be uninterrupted or error free. For warranty service, this product must be returned to a service facility designated by ELVESYS. Customer shall prepay shipping charges (and shall pay all duty and taxes) for products returned to ELVESYS for warranty service. Except for products returned to a Customer from another country, ELVESYS shall pay for return of products to the Customer.

ELVESYS does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer's applications by customer's technical experts. Recommended parameters can and do vary in different applications. ELVESYS reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

Limitation of warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Customer, Customer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation and maintenance.